

BROWNING (W)

THE NERVOUS AFFECTIONS THAT MAY
ARISE FROM MALARIA.

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THE NERVOUS AFFECTIONS THAT MAY ARISE FROM
MALARIA.

BY WILLIAM BROWNING, M. D.

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Of the various toxic agents, including thereunder infections as well as purely chemical poisons, that often attack the nervous system, malaria is one of the more common, the relative frequency, however, varying greatly with time and place. These parallel causes produce more or less comparable series of cases.

By malaria I mean not simply mal-aria, or bad air, but a distinct and infectious disorder.

It is especially in the larvated and chronic forms of intermittent poisoning that the nervous system becomes prominently involved. In such cases the patient may seek advice for the nervous affection simply. The true cause can then only be arrived at indirectly, and often one feels the lack of safe clinical guides. The blood-changes that in typical ague may be utilized for certainty in diagnosis, are, so far as we know, not present, or at least not easily demonstrated

here.¹ Where exacerbations or remissions occur the diagnosis is much assisted; but for the most part these are continuous conditions, and many of the manifestations are of secondary origin. Hence the personal equation of the observer may affect somewhat the trustworthiness of the etiological diagnosis. Many of the severest cases seen in Brooklyn have contracted their infection elsewhere; still those of home origin are ample in number and variety.

Though no recent or comprehensive review of this subject seems to have been made, it is customary and convenient to classify such cases according to the part of the nervous system specially attacked.

A. Brain.

B. Spinal Cord.

C. Peripheral Nerves.

A. The brain troubles attributed to this cause include: Intracranial inflammations of a meningitic type, mental disorders, pigmentary deposits,¹ epilepsy, chorea, aphasic symptoms, hysteria (Regnault's case, *Gaz. des Hôp.*, 1890, No. 3), neurasthenia and hysteroneurasthenia (Teissier's two cases, *Bull. Med.*, Paris, 1890, iv., 397-9).

These various forms merge, however, more or less, into one another. There is also an easy source of error in attributing to the brain proper various manifestations of neuritis of the cranial nerves, particularly those of the eye. In fact, it is more functional and symptomatic than settled organic brain disease that we see.

Meningitic troubles due to malaria in children are described by Forcheimer (Keating's *Cyclopædia*). Ferreira (*Archivio italiano di pediatria*, 1889, v. *Arch. f. Kinderheil.*, Bd. xii.) "distinguishes four varieties of the cerebral form [of malaria] which are especially seen in children during the heated seasons, and which are very frequent and very dangerous. These varieties are: 1. The eclamptic form. 2. The comatose form. 3. The delirious form. 4. The meningitic. The last two are observed more in older children."

That any wasting disease may lead to tubercular or other meningitis is well known. Without autopsy it is difficult to assert the occurrence of a meningitis strictly malarial, although it is certain

¹In Da Costa's severe case ("Malarial Paralysis," *Internat. Clinics*, Oct. 1891,) characteristic forms were found.

²The question of pigment emboli and deposits is essentially one of pathology, though Hammond (*Trans. Am. Neurolog. Assc.*, 1875,) and others have sought to deduce their clinical bearing. Councilman and Abbott (*Am. Jour. Med. Sci.*, 1885, April) have described these in connection with hyaline bodies but interest of late has shifted to the subject of micro-organisms.

that such a clinical type may develop in the pernicious forms. I will mention two cases. One, a man of twenty-six, was seen with Dr. Maddren in May, 1886; of good history; had contracted malaria in Memphis and suffered from it at intervals during the six months since his return. After some premonitions he wandered off from his home and was found by the police. He presented the usual symptoms of an acute encephalo-meningitis, and died in less than three days.

The other case was that of a girl of nine years, under my care in the fall of 1887; other members of the family said to have suffered from malaria recently. For a couple of months this girl had diurnal attacks of sleepiness, chilliness, yawning, fever, and often vomiting. At first these occurred two or three times a week, then every other day, and now daily. She lived a month after I first saw her, and for a time the chills were reduced again to every other day. She was brought to me for some general twitching, more on the left side, and a weakness in the left leg of two days' standing. There was paresis, tenderness, and swelling of the left lower extremity; left lower facial and half of tongue were also weakened; spleen greatly enlarged; temp., 100° . In a few days these left-sided symptoms nearly disappeared; but emaciation, variable fever (at times to 104°), and speechlessness, except crying attacks, became marked. Then an ordinary right hemiplegia developed, with variable contracture in right arm. These right-sided symptoms also improved somewhat, except the aphasia. She died some ten days later.

If such cases are of truly malarial nature, then it is equally a fact that when once developed they are exceedingly intractable to anti-malarial remedies.

Mental Disorders:—The paroxysmal type is illustrated by the case of a girl of twelve years, seen with Dr. H. C. McLean in March, 1891; of rather nervous parentage; has recently had mumps and whooping-cough, from which latter she has not yet fully recovered. Some two weeks ago she developed a remittent fever. Just as this appeared to be broken up she began to have peculiar sudden attacks, lasting an hour or more, often two or three times a day, and without equal-lengthened intervals. In these she is mentally alienated; more than simple febrile delirium; talks connectedly, but with perverse wickedness—abuses her parents, uses vile language, proposes to change her religion, says she is never going to get married, etc. She also complains of pain, first in one part of the body, then in another (shoulder, leg, ear, etc.) Some irregular fever has been noted, but not much perspiration;

perverse insomnia. In the free interims she wants to be about the house, and is quite her natural self. Seen in an attack: Hands cool, almost chilly; a general tremulousness, like an imperfect chill; P., 156; T., 103½° (in axilla); no enlargement of splenic dulness on percussion.

Dr. McLean reported that she soon recovered on anti-malarials, and remained well, so far as concerns the mental condition. But other cases of mental affection are described which do not follow the intermittent type.

Drs. Georges Lemoine and J. Chaumier (*Annales médico-psychologiques*, 1887, i., pp. 177-209; seen only in abstract), under the title "Mental Disorders in Cases of Malarial Disease," have treated this subject at length. They distinguish cases occurring during the febrile attack, those in convalescence from malarial fevers, and those in chronic malarial infection. One of their conclusions is that "there very probably exists a form of paludal pseudo-general-paralysis."

A case of morbid juvenile pyrophobia attributed to malarial toxæmia has been published by King (*Alienist and Neurologist*, 1880, July).

Epilepsy.—Malarial poisoning is recognized amongst the rarer causes of epilepsy. As the eclamptic spasms of infancy are so often due to sharp febrile attacks, and as the chill of intermittent is due to arterial spasm, it is not strange that malaria may cause convulsions, whether truly epileptic or not. This was evident in one young man (of twenty-two years), who several months previously developed epilepsy directly after an attack of chagres fever at Panama, although, as he was seen but once, the therapeutic proof is wanting. Fits lasting a couple of hours had recurred every month or two. In certain other cases it has seemed probable that this was one of the primary factors, the convulsive habit, as is well known, tending to continue independently when once started. In still other histories, some of them given in this paper, there is mention of epileptiform seizures. In some cases from this cause the convulsions seem to be a substitute for at least one of the manifestations of a rigor; in others they appear to be an indirect effect through the systemic poisoning. In this trouble, as in the malarial paraplegias of childhood, males seem to be predominantly affected. Historically, it may be said that the literature of this matter is not extensive. Many earlier East Indian and other cases are given by Handfield Jones in his work on "Functional Nervous Disorders" (Phila. 1868). Hammond (*l. c.*) has reported one case. McLane Hamilton (*Pepper's System*, V., p. 472) refers to Jacobi's

case (1879) and adds one of his own. It was in a young man; some periodicity in the attacks; great preliminary rise in temperature; intercurrent somnolence and facial neuralgia. Two cases of malarial pseudo-epilepsy, recovery, are given by H. C. Wood, (*Phila. Med. Times*, 1883, May 19).

Various references and observations are given in an editorial in the *Alienist and Neurologist* for April, 1886 ("The Malarial Epileptoid Nature of Narcolepsy"). Recently Morini has added a case ("Di una febbre perniciosa epilettica con afasia e paralisi del nervo facciale destro"). According to Dr. Tusa Salvatore ("Su di un caso di epilessia da malaria cronica," *Riforma Med.*, 1891, Dec. 13, p. 723; patient, a chap of sixteen years) such an epileptic form of pernicious fever has been mentioned by various ancient and modern writers—Frank, Griesinger, Kelsch and Kierner.

E. W. Hill (*Bost. M. & S. J.*, 1892, i., p. 651) gives two cases in boys of eighteen and nine years, though it is doubtful whether the former was epilepsy, as it was so soon fatal. He also credits Echeverria (1870) with two cases.

Krafft-Ebing describes as larvated intermittent the case of a man of 29, (*Wien. Med. Presse*, 1892, No. 1, v. *Centbl. f. m. Wissc.*, 1892) who in the recurrence after a head injury, had attacks of epileptic convulsions, dizziness, stupor and delirium. The neurotic symptoms attended the intermittent (first tertian, then quotidian) but were not febrile, as their intensity did not correspond to the degree of fever. Quinine and arsenic cured, the nervous attacks vanishing sooner than the fever.

CHOREA, if produced by malaria at all, has seemed to me to be only a rare secondary effect, though some choreiform twitchings are occasionally seen, as in one of the cases already given.

Hammond (*l. c.*) attributes one case of chorea to this cause, and Vought (in Starr's "Familiar Forms of Nervous Disease") 3 out of 124 cases.

Dr. C. F. Barber, speaking of observations in the nerve department at the Eye and Ear Hospital, and Dr. Maddren, from his long experience in the children's room at the Central Dispensary, have noticed, as they kindly inform me, that in many of the choreic children from the lower and outlying wards quinine is a valuable adjunct in treatment, whilst in other choreics this has not been noticeable in comparison. They conclude that in numerous cases malaria is a factor favoring the development of chorea, and that then direct treatment of this element hastens cure.

Aphasia:—More or less marked speech troubles, though usually quite absent, are nevertheless rather common in these nerve cases

from malaria. In fact, there is sufficient evidence to establish this as a valuable positive symptom when present. Attention was directed to this by Singer. Morini's mixed case above includes this symptom. I have noted it in some of the paraplegic cases, and also in two given elsewhere in this paper. This type was also thought to be present in the case of a colleague seen last spring. In many of these cases there seems to be only an impediment or difficulty in talking, as though it required a greater incentive than usual. In others it is more distinctly an aphasia or a paraphasia. As to its exact nature and seat there is chance for some difference of opinion.

B.—SPINAL TROUBLES.

It is not as yet established that these are ever of malarial origin, although Morton Prince, of Boston (*Jour. Nerv. & Ment. Dis.*, 1889, Oct.) believes it for certain cases of tabes and disseminated sclerosis. Torti and Angelini have also recently described chronic malarial infection with symptoms of sclerosis en plaques. In this respect the paludal poison is comparable to alcohol. It affects preferably the peripheral nerves, but in many cases the brain is either also involved to a limited extent or may alone suffer. For some unexplained reason the cord seems to have a remarkable immunity to both these agents. In various spinal cases one finds a past history of malaria, but not closely enough connected with the myelitis to be considered the cause.

It has been suggested that cerebro-spinal meningitis might be of miasmatic origin. A boy of five years, living beside Gowanus Canal, seen with Dr. Maddren in April of this year, was sick several weeks with variable fever, general tenderness, distinct opisthotonos, etc. He did best on anti-malarials, and finally recovered, but it was not a clear case. Dr. Bartley gives the following notes of a more definite case in a boy of three years: He was seen by several competent men and considered to be suffering from sporadic cerebro-spinal meningitis. There was wry-neck, pain on motion of head, tenderness along post-cervical region, and on percussing over the spleen, low fever, tache cerebrale, anæmia, etc. Under quinine he recovered completely in a week. In such forms as this there can only be a pseudo-meningitis, but its occurrence may explain some of the so-called sporadic cases.

C.—PERIPHERAL NERVES.

Of this class are a majority of the nerve cases from malaria as seen in general practice. Most of these fall under one of two clinical types: (a) Neuralgia, (b) Neuritis, although (c) Contractures,

and (d) Paralyzes appear also to occur as independent manifestations.

a That neuralgia is frequently due to this cause is so well known that, though a very important fact, it need be but briefly considered. In neuralgia remissions are the rule, whilst in neuritis any such feature is necessarily obscured. Doubtless the neuralgia is often but the first stage of neuritis. Whilst, perhaps, any nerve in the body may be attacked, there are certain favorites. Amongst neuralgias brow-ague and sciatica are best known, though in Brooklyn, at least, other forms are common. One case of severe cruralgia (left anterior) was in a night engineer employed in the basement of a New York printing establishment (seen in Jan., 1888; has remained free since). Visceral neuralgias, taking the form of colic, are often very severe, as in a recent case contracted in West Florida. Another form in a colleague (living on the line of the great storm-sewer excavation) was located by him deeply beneath the bridge of the nose, and a lighter similar case might be added. Various headaches, more or less migranous in character, are common, and, unfortunately, these may continue later as a less frequent hemicrania or migraine. In one case (wife of the just-mentioned colleague), where the brachial plexus with the arm-nerves was the seat, tender points became established at neck, shoulder and elbow. In the preradial region the pain became especially severe. Reddish papules, with incipient ulceration, appeared over ball of thumb, and a couple of the former even up the arm. This cutaneous trouble was possibly herpetic in its nature. The whole yielded promptly to systemic remedies.

Two cases of paludal neuralgia of the tongue leading to ulceration have been recorded by Diberder (1891).

The literature of this branch is too vast for more than a few brief references.

H. C. Coe (1891) found the malarial element to be important in one case of oöphoralgia. Malarial cardialgias and gastralgias are mentioned by Rosenthal (1885).

The following excerpts are from an article by C. Heinemann, "On Malarial Diseases, etc., in Vera Cruz" (Virch. Archv., cii., 1885, p. 467):

"(e) Rare but very important is the form accompanied by distinctly intermitting, often excessively severe, colic attacks and by obstinate constipation, in which neither clysters nor narcotics are of use, but practically a few doses of quinine."

"(g) Cerebral form, principally in children (unrest, delirium, coma, etc., at attack)."

“(h) Eclamptic form, frequent in children, but entirely favorable in prognosis.”

P. 490: “Most frequent are neuralgias in the trigeminal region, almost as frequent are those in the region of the cervical plexus, much less often pure intercostal, and most rare sciatica. Phrenic neuralgia is strikingly common, notably in women.”

b Neuritis:—This affects single nerves, a whole plexus, or may appear as a general multiple neuritis. However, these cases of involvement of particular nerves are rarely without other manifestations. Although Goldscheider has recently remarked that participation of cranial nerves in the lesions of multiple neuritis is very uncommon, such is certainly not the case in forms due to diphtheria or malaria. Of single nerves, the facial is occasionally attacked, as, possibly, in Morini's case, and certainly in at least one of my own. In Singer's case of general malarial neuritis both facials became involved.

Without question the optic nerve is especially prone to this affection, as shown by my own and many other cases. To this MacNamara has called attention (“Malarial Neuritis and Neuroretinitis,” *Brit. Med. Jour.*, 1890, March 9).

The following quotations are from Kipp (“Eye affections from malarial poisoning,” *Trans. Med. Soc. of N. J.*, 1881, p. 121): “Temporary amaurosis, commonly of both eyes, has been repeatedly observed as a complication of the paroxysms of intermittent fever.” “Optic neuritis after intermittent fever has been observed a number of times.” “Atrophy of optic nerves was observed to follow intermittent fever of long duration in two cases by Peunoff.” “Partial or total loss of vision of one or both eyes, without visible changes in the eye, and therefore probably dependent on disturbances in the nervous centres, as a sequela of latent or manifest intermittent fever, has been observed a number of times.” “The amblyopia which is developed in patients who have suffered for a long time from pronounced intermittent fever is undoubtedly often due to albuminuric neuro-retinitis, as I know from personal observation, but certainly not in all.” Sulzer's observations (1890) amply bear out most of the statements of Kipp.

Of cases involving a plexus or group of nerves, there is quite a variety. Dermatologists teach that some forms of herpes, especially the oral, may be due to this cause. Dr. Maddren has found that herpes zoster in children is frequently of this origin, whilst Yandell (“Malaria and Struma,” *Amer. Pract.*, 1878, Jan.) claims that all forms of herpes may be due to malaria. That quinine affords relief in such cases is, perhaps, not sufficient proof of the cause.

From two recent cases, there appears to be a special form of malarial neuritis, selecting more particularly the cranial nerves, and simulating brain tumor.

1. A girl of seven-and-a-half years, sent in on March 26, 1892, by Dr. Hirschmann, who had been treating her for malarial manifestations. Of other children, four are living—one a bright child now seventeen years old—and four are dead, one older, and another of diphtheria at three-and-a-half years. This girl also had diphtheria two years ago, and is said to have subsequently had one attack like the recent ones. Formerly very spare, but since scarlet rash last June has been growing stout, and is now excessively so; hands and feet said to have been swollen; puffy, florid complexion; always troubled with “snuffles”; now, for two weeks, every other day, a “bad spell,” as it is called. Just before these, as before the one two years ago, the right eye suffuses with water and she complains of right supraorbital pain. This is followed by pain in the back, darkness before the eyes, and loss of power, so she has to be carried; drowsy and sleepy all day; expression dull and stupid; pulse, 120 (sitting quietly); enuresis on any slight cause, and regularly at night; pains in arm muscles and back of neck; very restless in sleep, with head thrown far back; “snores terribly”; hard of hearing since scarlatina. A recent fall has increased many of these symptoms. At school but two months this winter, as she was too restless. Is not able to find her way, because of trouble with vision. The right eye was found to be blind and sight in the left was very imperfect; good reaction from left eye to either pupil, but none to either from the right; left pupil the wider in the dark. On covering left eye, both turned to extreme right conjugation, and could not voluntarily be brought back. In April she was examined by Dr. Alleman, who wrote: “This may be from intracranial trouble. There is evidence of an old neuro-retinitis, which may as well be due to tumor as to Bright’s.” At the same time there was a speech impediment; when she could be made to say anything, this seemed nearest a lisp. Dr. Dudley said, with regard to this: “I think the imperfection in speech is due to partial paralysis of soft palate, rather than to a neurosis of the larynx.” He also found a “moderate-sized adenoid in the naso-pharynx and hypertrophy of both tonsils.” Tongue somewhat white; from some medication she is said to have recently passed many pin-worms.

She made little advance until put on anti-malarials; by the end of April she had, however, made good progress; hearing now excellent; enuresis much better; pulse, 108 (sitting); speech better than ever before; no longer any trouble in walking; no weak at-

tacks nor supraorbital pain, though little change in vision. But May 8th she had a bad attack of fever, with suffusion of right eye, and vomiting, and became quite blind. There was again some increase in flesh, or, more probably, neuritic œdema. Bowels move often, but insufficiently; there is also frequent complaint of itching that changes about over the body.

Energetic treatment was again instituted, with satisfactory improvement in all respects except vision. When last seen, in August, she had recovered from everything except loss of sight; bright, active; no longer a swollen appearance; speech and hearing excellent; rarely enuresis, and then only from a cold or some upset; splenic dulness now three inches across; general health better even than that of the other children; right eye still totally blind; the left has fair vision in a very limited area (merely a spot), not quite in the macula; even this is a decided improvement. Dr. J. S. Wood at this time found white atrophy of right optic nerve and a strong suggestion of the same condition in the left. From the age of the patient and the progress, although limited, that has already been made, I trust she will regain still further the use of the left eye at least.

2. Boy of nine years, referred to me by Dr. Law, April 30, 1892. "He has always been malarious"; otherwise well until two months ago, when he came from school complaining of occipital ache. This increased so that he would cry all night. Meanwhile the head became turned to the left (*i. e.*, it tipped to the left with the chin a trifle to the right; wry neck). A thorough course of quinine has somewhat relieved the neck and, to a slight degree, other symptoms. The headache has the last two weeks changed to supraorbital; it is not continuous; he may be two, three or four days free, then often suffers all day—though it may change rapidly; it often begins about 2 or 3 A.M.; no supraorbital or suboccipital tenderness. One morning about five weeks ago the left eye was noticed to be turned in, and this is now thought to be true of both eyes. At first there was double vision, but he no longer minds it. The left eye is said to be worse than at first; it is directed not only inwards, but a trifle upwards. On testing, the right eye fails to turn fully to the right, though in all other directions. Hence, as the left eye turns outwards only just to the median line, there is a paralysis of the left abducens and paresis of the right. Up to a couple of weeks ago, if lying on his back, he had difficulty in rising because of pain in the popliteal region. But this leg trouble, his appetite, wry neck and general condition have all improved somewhat; not so the headache and eyes.

Tongue much coated; it comes out straight, but in the act of retracting invariably turns to the right; some morning nausea, relieved by food; average grip, R., 24; L., 27 (is right-handed, though several in family are left); tendon reflexes all normal; turns and tips head in all directions with about equal freedom; he seems to hold head slightly tipped to the left, however—possibly an attempt to compensate for a weak eye muscle. Apparently feverish at times and Dr. Law has found some rise in temperature. Hands and feet now always cold; heart rather large; cardiac sounds clear; P. 104 and weak; pupils equal—both wide, even on illumination; right retina pale, granular, showing one whitish, radiating streak; the disc somewhat blurred and indefinite; vessels small and few; both discs pinkish, the left more blurred or choked, and shows several faint lines, with few vessels; mental condition said to be clear, still there is some stupor, listlessness, and a countenance devoid of expression; splenic dulness five inches across. My own examination of a single sample of blood proved negative (Been taking quinine.)

He then was sent into the country and improved in all respects until June 19th, when he had an onset of fever lasting two days and leaving him totally blind. In this attack he had a series of convulsive movements in the left arm, throwing this and the shoulder forwards across the chest. No loss of consciousness, and he was able to foretell the spasm each time. The optic discs now showed more blurring of outline, pinkishness and swelling. In either macular region transverse white bands, as though a rake had been dragged across; also an occasional irregular white spot in either fundus. Frequently troubled by itching, first in one part of body, then in another. More vigorous treatment was now instituted.

By July 29th, he had recovered in all respects except vision; right eye still blind; in left perception of light only; no weakness of any ocular muscle; pupils react from either eye; optic discs somewhat clearer; splenic dulness half an inch less; is said to be brighter than ever before in his life. There has been further subsequent improvement in vision, so that now (Nov.) he can distinguish objects and black from white.

Each of these two patients presented the appearance and symptoms of tumor of the brain. The suspicion that they might be something else arose from difficulty in localization; even an internal hydrocephalus could not satisfactorily account for the symptoms. A grouping of these seemed to point to systemic conditions,

and the histories suggested malaria as the most probable cause of this class. Their subsequent course has seemed to bear this out.

Probably of similar nature is the first case of Joseph W. Bauer ("Nervous Affections of Malarial Origin," *St. Louis Clinical Record*, 1879, Dec.), though termed by him "Diffuse Neuritis." It was in a woman of twenty-eight years, "double supraorbital neuritis extending down the left side of neck, shoulders and scapula"; bulging of eyes; vision at first dim, then quite lost. Cured.

Perhaps also Marchiafava's various cases of pernicious malarial infection, with symptoms of bulbar paralysis, belong here.

Multiple neuritis of the paraplegic type is well recognized. This does not appear to be a Brooklyn form. The two probable cases that I have seen both came from outside.

An undoubted case of general neuritis from malaria, in a boy of nine, is given by J. W. Bauer (*l. c.*, Case II; called by him "polio-myelitis anterior"; relative recovery). Kohler (1879) published a case of acute ataxia cured by quinine. Da Costa's case was also of the ataxic type, and he quotes another from M. H. Bell.

Singer (1887) gives details of a case of acute polyneuritis from East Indian malaria in a man of twenty-six.

Strachan, of Kingston, Jamaica, has an article on malarial multiple peripheral neuritis in *Sajou's Annual* (1888, i., 139-141). "One can almost pick out these cases by noting those patients who are sitting up in bed rubbing their feet and moaning and crying. In more advanced cases there is extreme muscular wasting. "It is the more chronic form of malarial poisoning which is followed by neuritis."

Cardoso Fonte has also considered this form ("Impaludismo larvado, paraplegia completa," *Brazil Med.*, 1889-90, ix.).

An ordinary case of this has recently been added by J. Fayrer (*Indian Med. Gaz.*, 1892, xxvii., 11-13). It began in the lower extremities, but subsequently involved the upper as well. In his case, also, a fall may have had to do with the onset. It is especially noticeable that after partially recovering he had a slight attack of fever and ague, with great exacerbation of all symptoms.

Various other reports of this type are on record.

c Paralysis:—That this represents one feature in the neuritic cases follows of itself. This is, however, a secondary, slow form. Apart from these there are several published reports showing that transient forms occur. The intermittent has, perhaps, been longest known. A. D. Rockwell has described a daily-recurring intermittent hemiplegia in a man of middle life, and probably malarial (*N. Y. Med. Jour.*, 1887, Sept.) Intermittent malarial paraplegias are

reviewed by Birdsall in Sajous' Annual (1889, ii., 110). Whitaker's case (1887) of hemiparesis and neuralgia was periodic and cured by quinine. Some of the several reported cases of recurring paralysis of the four extremities have been in persons where a strong suspicion of malarial influence was warranted, although an unknown autointoxication has also been assumed.

Besides these rare intermittent cases, occurring principally, if not wholly, in adults, there is also the continuous youthful form, to which I have recently devoted sufficient space (*Am. Jour. Med. Sci.*, 1891, Dec.)

It is noticeable that all these paralyses directly malarial affect at least two extremities, and never, apparently, a single nerve, as does neuralgia or contracture. Whether this type depends upon an intoxication of the spinal centres, or is a purely peripheral effect (neuro-congestive, myalgic), or what the pathology is, does not appear to have been elucidated. That it is functional, rather than organic, and that it may be directly toxic, is probable. Or, as Leyden puts it in referring to Landry's paralysis, "The toxic agent first disturbs functions; the material degenerations follow"—such degeneration in malarial cases, however, not necessarily resulting if the poisonous influence be remedied promptly.

d Contractures:—These may be either limited, spasmodic—and then rapidly remediable—or more general atrophic, secondary to neuritis, and then of a chronic character. Wry-neck is the most common. A case of this in a girl of three-and-a-quarter years occurred in a family where the mother had suffered from brow-ague and a brother from the youthful form of paraplegia. She recovered on quinine. A small boy with this trouble is now recovering in like manner. In the cases from Drs. Law and Bartley, above given, torticollis was one symptom. A similar case and other data on this point may be found in Holt's article (*N. Y. Med. Jour.*, 1883).

As to the other factors favoring the development of neural disturbances in these patients, there is, of course, in the severer forms often poor heredity, exposure, falls, etc. This disposition is also greatly increased, according to Teissier ("Des troubles nerveux lointains consecutifs au paludisme," *l. c.*), by functional liver troubles, and that to neurasthenia in particular by renal insufficiency. Age is an important element, as nearly all these patients are young persons. In some forms males make up the main contingent.

Most often occur neuralgias, then neuritis, occasionally the temporary paralyses, finally the rarer other troubles mentioned. Definite lesions of the central nervous system must be very un-

usual, despite the various forms of serious functional disturbance above cited.

In conclusion, it may be well again to remark that malaria is but one of the various causes of nervous diseases. There is a justifiable aversion to the over-frequent assumption of a malarial influence; still this need not blind us to present facts. A more careful scrutiny of our cases may show that at certain times and in certain places these nervous manifestations from malaria are far from uncommon.

